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HINGE MECHANISM FOR FOLDABLE ELECTRONIC DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to hinge mechanisms, and more particularly to a hinge mechanism for hinging together the housings of a foldable, portable electronic device such as a foldable radiotelephone.

2. Related Art

Portable radiotelephones generally have two housings joined by a type of hinge that allows the housings to fold upon one another. Many such foldable radiotelephones have most of the electronics in one housing, called the main housing, and fewer electronics in the other housing, called the cover. Other such foldable radiotelephones have all the electronics in the main housing, with the cover serving only to cover a keypad and a display of the main housing. The main housing and the cover are connected together by a hinge mechanism. The opening or closing of most covers is achieved by means of cams of the hinge mechanism.

One such kind of hinge mechanism is disclosed in China Pat. No. 98109390.6 issued to Kato Electric & Machinery Company. The hinge mechanism comprises a shaft with a flange, a spring, a cam with a hole therethrough, and a sliding cam with a hole therethrough. The cam is fixed to the shaft, while the sliding cam is rotatably assembled on the shaft opposite to the cam. The cam and the sliding cam can slide on the shaft. The spring surrounds the shaft. The sliding cam is fixed to the cover of a portable radiotelephone, while the cam is fixed to the main housing of the portable radiotelephone. When the cover is manually opened, the sliding cam rotates together with the cover. Simultaneously, the spring is pressed as a convexity of the sliding cam rides along a convexity of the cam. Once the cover is opened to a given angle, the cover can continue to open automatically by action of the spring and the convexities. The process of closing the cover is substantially the reverse of the above-described opening process.

However, the convexities are difficult to manufacture. In addition, extra space in the housing and the cover is required for the hinge mechanism. This makes manufacturing of the housing and the cover difficult.

What is need, therefore, is a hinge mechanism which is relatively simple and easy to manufacture.

SUMMARY

In preferred embodiments herein, a hinge mechanism is provided for pivotably joining a cover to a main housing of a foldable radiotelephone. The hinge mechanism comprises a rotation assembly comprising a hollow connecting member, two shafts adapted to pivotably connect opposite ends of the connecting member with the cover and the main housing, and an elastic member received in the connecting member. Two opposite ends of the elastic member are engaged with the shafts respectively. At least one of the shafts is slidable along a longitudinal axis of the connecting member. When the cover is manually opened relative to the main housing, the at least one shaft slides along the longitudinal axis in a first direction and stretches the elastic member. When the cover reaches a predetermined angle relative to the main housing, the elastic member rebounds and drives the at least one shaft to slide along the longitudinal axis in a second direction opposite to the first direction, whereby the cover is automatically further opened relative to the main housing.

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In preferred embodiments herein, a foldable electronic device is provided. The hinge mechanism comprises a main housing having a first socket in one end thereof, a cover having a second socket in one end thereof corresponding to the first socket, and the above-described connecting member of the hinge mechanism received in the first and second sockets and thereby interconnecting the cover and the main housing.

Other advantages and novel features of the embodiments of the present invention will become more apparent from the following detailed description of preferred embodiments thereof when taken in conjunction with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded, isometric view of a rotation assembly of a hinge mechanism in accordance with a preferred embodiment of the present invention;

FIG. 2 is an exploded, isometric view of a foldable radiotelephone including the hinge mechanism of the preferred embodiment of the present invention;

FIG. 3 is an isometric view of the foldable radiotelephone of FIG. 2 fully assembled, and showing a cover of the foldable radiotelephone in a partly open position;

FIG. 4 is an enlarged, cut-away side view of part of the foldable radiotelephone of FIG. 3, but showing the foldable radiotelephone in a closed position and the hinge mechanism in a first state;

FIG. 5 is similar to FIG. 4, but showing the foldable radiotelephone in a half open position and the hinge mechanism in a second state;

FIG. 6 is similar to FIG. 5, but showing the foldable radiotelephone in a fully open position and the hinge mechanism in a third state; and

FIG. 7 is an enlarged view of a portion of a cover of the foldable radiotelephone of FIG. 2, showing parts of a second spindle of the hinge assembly, details of such parts being shown by broken lines.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawings in detail, FIGS. 1 to 3 show a hinge mechanism for joining a first component of a foldable electronic device like a main housing 4 of a foldable radiotelephone (not labeled) to a second component of the foldable electronic device like a cover 5 of the foldable radiotelephone.

Referring to FIG. 2, the main housing 4 and the cover 5 each have a first end and a second end, with the first ends of the main housing 4 and the cover 5 being connected together. A single connecting assembly 2 is located on both the main housing 4 and the cover 5. Also referring to FIG. 7, the connecting assembly 2 comprises a first spindle 41, two second spindles 51, two blocks 54, and two press springs 511 installed in the second spindles 51 respectively. The first spindle 41 and the second spindles 51 are respectively formed at the first ends of the main housing 4 and the cover 5. A central axial through hole (not labeled) is defined in the first spindle 41. A central axial hole 513 is defined in each second spindle 51, for containing the corresponding press spring 511. One end of the press spring 511 is fixed to the corresponding block 54. The press springs 511 are used to press the blocks 54 to project into the through hole of the first spindle 41. Two first sockets 43 and two grooves 44 are defined at the first end of the main housing 4. Two holes 47